

# QUALITY CONTROL TEST REPORTS

**Client:** Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency:** Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of Work :** Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

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## QC ABSTRACT

Name of Work: Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

| Sl. No. | Item         | Quantity As Per BOQ | Required No's of testes | Actual No's of testes | Testes |
|---------|--------------|---------------------|-------------------------|-----------------------|--------|
| 1       | 1:3:6        | 21.17 Cum           | 1                       | 1                     | Pass   |
| 2       | M20          | 41.74 Cum           | 4                       | 4                     | Pass   |
| 3       | Slab (230mm) | 7.20 Sqm            | 1                       | 1                     | Pass   |
| 4       | Slab (100mm) | 111.24 Sqm          | 1                       | 1                     | Pass   |
| 5       | GSB          | 9.24 Cum            | 1                       | 1                     | Pass   |
| 6       | WMM          | 13.774 Cum          | -                       | -                     | -      |
|         |              | Gradation           | 1                       | 1                     | Pass   |
|         |              | AIV                 | 1                       | 1                     | Pass   |
|         |              | Shape Test          | 1                       | 1                     | Pass   |
|         |              | Atterberg Limits    | 1                       | 1                     | Pass   |
| 7       | DBM          | 3.08 Cum            | -                       | -                     | -      |
|         |              | Quality of Binder   | 1                       | 1                     | Pass   |
|         |              | AIV                 | 1                       | 1                     | Pass   |
|         |              | Shape Test          | 1                       | 1                     | Pass   |
|         |              | Gradation           | 1                       | 1                     | Pass   |
|         |              | Specific Gravity    | 1                       | 1                     | Pass   |
|         |              | Stability of Mix    | 1                       | 1                     | Pass   |
|         |              | Bitumen content     | 1                       | 1                     | Pass   |
| 8       | BC           | 13.44 Cum           | -                       | -                     | -      |
|         |              | Quality of Binder   | 1                       | 1                     | Pass   |
|         |              | AIV                 | 1                       | 1                     | Pass   |
|         |              | Shape Test          | 1                       | 1                     | Pass   |
|         |              | Gradation           | 1                       | 1                     | Pass   |
|         |              | Specific Gravity    | 1                       | 1                     | Pass   |
|         |              | Stability of Mix    | 1                       | 1                     | Pass   |
|         |              | Bitumen content     | 1                       | 1                     | Pass   |

**A.E.E**

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Cubes  
0-5 Cum 1Set  
6-15 Cum 2Set  
16-30 Cum 3Set  
31-50 Cum 4Set  
Add 1set for extra 50Cum

For CIVIL AIM CONSULTANTS & ENGINEERS

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Authorised Signatory

No. 01, Satvika Nilaya, Opp. Widia Poorna Prajna School,  
Ramaiah Layout, Nagasandra, Bangalore - 560 073.

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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 11.01.2023

## TEST REPORT

|                     |   |                                                                                                                                              |
|---------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------|
| CLIENT              | : | Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.                                                                       |
| AGENCY              | : | Sri. Nandan Kumar M N, Contractor, Bangalore.                                                                                                |
| NAME OF THE WORK    | : | Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore. |
| SAMPLE ID           | : | Cement (Dalmia OPC 53 Grade)                                                                                                                 |
| DATE OF MANUFACTURE | : | December - 2022                                                                                                                              |
| DATE OF TESTING     | : | 09.01.2023 to 11.01.2023                                                                                                                     |
| SAMPLES SUPPLIED BY | : | AGENCY                                                                                                                                       |

The results of the tests conducted on the cement sample are as follows:

| Sl.No | Descriptions            | Test Method as per IS                       | Test Result | Requirements as per IS: 269-2015 |
|-------|-------------------------|---------------------------------------------|-------------|----------------------------------|
| 1     | a) Initial Setting Time | IS-4031 (Part -5)                           | 140 Minutes | Not Less than 30 Minutes         |
|       | b) Final Setting Time   | IS-4031 (Part -5)                           | 330 Minutes | Not More than 600 Minutes        |
| 2     | Soundness               | IS-4031 (Part 3) by the Le-Chatelier method | 1 mm        | Not more than 10 mm              |
| 3     | Standard Consistency    | IS-4031 (Part -4)                           | 30.00 %     | -                                |

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**A.E.E**

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*P. K. Konth*  
Authorised Signatory



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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 11.01.2023

## TEST REPORT ON FINE AGGREGATES (SAND)

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of Work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Date of Testing** : 11.01.2023

**IS Code** : IS 383:2016

: IS 2386 (Part 1):1963(RA 2011)

**Material** : Sand

**Total Wt. of Aggregates in gms**

1000

| Is Sieve Size in mm | Weight Retained (gm) | Retained Weight in % | Cumulative Retained Weight in % | Cumulative Weight Passing in % | Spec.Limits For Zone-II |
|---------------------|----------------------|----------------------|---------------------------------|--------------------------------|-------------------------|
| 10                  | 0                    | 0                    | 0                               | 100                            | 100                     |
| 4.75                | 89                   | 8.90                 | 8.90                            | 91.1                           | 90-100                  |
| 2.36                | 135                  | 13.50                | 22.40                           | 77.6                           | 75-100                  |
| 1.18                | 182                  | 18.20                | 40.60                           | 59.4                           | 55-90                   |
| 600 Micron          | 155                  | 15.50                | 56.10                           | 43.9                           | 35-59                   |
| 300 Micron          | 220                  | 22.00                | 78.10                           | 21.9                           | 8-30                    |
| 150 Micron          | 146                  | 14.60                | 92.70                           | 7.3                            | 0-10                    |

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Job No.:

CACE/BBMP/NKMN/W.No.01/2022-23

Date : 11.01.2023

## TEST REPORT ON FINE AGGREGATES (SAND) IS 2116-1980

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of Work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Date of Testing** : 11.01.2023

**Material** : Sand - Masonry

Total wt. of aggregates in gms = 1000

| Is Sieve Size in mm | Weight Retained (gm) | Retained Weight in % | Cumulative Retained Weight in % | Cumulative Weight Passing in % | Spec.Limits as per IS 2116-1980 |
|---------------------|----------------------|----------------------|---------------------------------|--------------------------------|---------------------------------|
| 4.75                | 0                    | 0.00                 | 0.00                            | 100.0                          | 100                             |
| 2.36                | 19                   | 1.90                 | 1.90                            | 98.1                           | 90-100                          |
| 1.18                | 35                   | 3.50                 | 5.40                            | 94.6                           | 70-100                          |
| 600 Micron          | 86                   | 8.60                 | 14.00                           | 86.0                           | 40-100                          |
| 300 Micron          | 255                  | 25.50                | 39.50                           | 60.5                           | 5-70                            |
| 150 Micron          | 486                  | 48.60                | 88.10                           | 11.9                           | 0-15                            |

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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 11.01.2023

## TEST REPORT ON COARSE AGGREGATES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.  
**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.  
**Name of Work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.  
**Date of Testing** : 11.01.2023  
**IS Code** : IS 383:2016  
: IS 2386 (Part 1):1963(RA 2011)  
**Material** : 20mm Aggregates

Total Wt. of Aggregates in gms= 5000

| Is Sieve Size in mm | Weight Retained (gm) | Retained Weight in % | Cumulative Retained Weight in % | Cumulative Weight Passing in % | Spec.Limits |
|---------------------|----------------------|----------------------|---------------------------------|--------------------------------|-------------|
| 40                  | 0                    | 0                    | 0                               | 100                            | 100         |
| 20                  | 189                  | 3.8                  | 3.8                             | 96.2                           | 95-100      |
| 10                  | 2436                 | 48.7                 | 52.5                            | 47.5                           | 25-55       |
| 4.75                | 1965                 | 39.3                 | 91.8                            | 8.2                            | 0-10        |

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*P*  
*AG-01*  
*R*  
**A.E.E**

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*P. V. K. K. K.*  
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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 11.01.2023

## TEST REPORT ON COARSE AGGREGATES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.  
**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.  
**Name of Work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.  
**Date of Testing** : 11.01.2023  
**IS Code** : IS 383:2016  
: IS 2386 (Part 1):1963(RA 2011)  
**Material** : 40mm Aggregates

Total Wt. of Aggregates in gms 15000

| Is Sieve Size in mm | Weight Retained (gm) | Retained Weight in % | Cumulative Retained Weight in % | Cumulative Weight Passing in % | Spec.Limits |
|---------------------|----------------------|----------------------|---------------------------------|--------------------------------|-------------|
| 80                  | 0                    | 0                    | 0                               | 100                            | 100         |
| 40                  | 189                  | 1.26                 | 1.26                            | 98.74                          | 95-100      |
| 20                  | 8236                 | 54.91                | 56.17                           | 43.83                          | 30-70       |
| 10                  | 3256                 | 21.71                | 77.87                           | 22.13                          | 10-35       |
| 4.75                | 2810                 | 18.73                | 96.61                           | 3.39                           | 0-5         |

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A.E.E



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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 12.01.2023

## TEST REPORT OF PHYSICAL PROPERTIES OF REINFORCEMENT STEEL

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.  
**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.  
**Name of Work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.  
**Steel Dia/Length** : 10mm,12mm " Fe500 TMT Bars"  
**Reference to BIS codes** : IS 1786:2008(RA 2013) High Strength Deformed Steel Bars and Wires for Concrete Reinforcement-Specification  
: IS 1608:2005 Metallic Materials- Tensile Testing at Ambient Temperature  
**Date of test** : 12.01.2023

| S.No | Brand | Nominal size (dia in mm) | Mass per meter (kg/meter) | TENSILE STRENGTH                                       |                                       |             |                                     |
|------|-------|--------------------------|---------------------------|--------------------------------------------------------|---------------------------------------|-------------|-------------------------------------|
|      |       |                          |                           | 0.20 % proof stress/ yield stress (N/mm <sup>2</sup> ) | Tensile strength (N/mm <sup>2</sup> ) | TS/YS ratio | Elongation, percent on gauge length |
| 1    | TMT   | 10                       | 0.617                     | 555                                                    | 642                                   | 1.16        | 14                                  |
| 2    | TMT   | 12                       | 0.889                     | 568                                                    | 665                                   | 1.17        | 15                                  |

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*A.E.E.*  
*AB-01*

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*Pranav*  
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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 14.02.2023

## TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of the work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Sample ID** : Cement Concrete

**Size of cubes** : 150mmx150mmx150mm

**Cross Sectional Area** : 22500 mm<sup>2</sup>

**Technical Reference** : IS: 516-1959 (Reaffirmed 2008)

**Grade of Concrete** : M<sub>20</sub>

**Compressive Strength as on** : 28th day

| Sl.No. | Date of casting | Date of testing | Weight of cube (Kg) | Failure load (KN) | Compressive strength (N/mm <sup>2</sup> ) |
|--------|-----------------|-----------------|---------------------|-------------------|-------------------------------------------|
| 1      | 17.01.2023      | 14.02.2023      | 8.189               | 500.3             | 22.24                                     |
| 2      | 17.01.2023      | 14.02.2023      | 8.165               | 489.6             | 21.76                                     |
| 3      | 17.01.2023      | 14.02.2023      | 8.156               | 492.3             | 21.88                                     |

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*P*  
*AB-01*  
*R.K.*  
**A.E.E**

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*P/Kanth*  
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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 24.01.2023

## TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of the work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Sample ID** : Cement Concrete

**Size of cubes** : 150mmx150mmx150mm

**Cross Sectional Area** : 22500 mm<sup>2</sup>

**Technical Reference** : IS: 516-1959 (Reaffirmed 2008)

**Grade of Concrete** : M<sub>20</sub>

**Compressive Strength as on** : 7th day

| Sl.No. | Date of casting | Date of testing | Weight of cube (Kg) | Failure load (KN) | Compressive strength (N/mm <sup>2</sup> ) |
|--------|-----------------|-----------------|---------------------|-------------------|-------------------------------------------|
| 1      | 17.01.2023      | 24.01.2023      | 8.189               | 329.3             | 14.64                                     |
| 2      | 17.01.2023      | 24.01.2023      | 8.168               | 356.3             | 15.84                                     |
| 3      | 17.01.2023      | 24.01.2023      | 8.154               | 336.2             | 14.94                                     |

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*Rg*  
*AG-51*  
**A.E.E**

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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 14.02.2023

## TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of the work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Sample ID** : Cement Concrete

**Size of cubes** : 150mmx150mmx150mm

**Cross Sectional Area** : 22500 mm<sup>2</sup>

**Technical Reference** : IS: 516-1959 (Reaffirmed 2008)

**Grade of Concrete** : M<sub>20</sub>

**Compressive Strength as on** : 28th day

| SLNo. | Date of casting | Date of testing | Weight of cube (Kg) | Failure load (KN) | Compressive strength (N/mm <sup>2</sup> ) |
|-------|-----------------|-----------------|---------------------|-------------------|-------------------------------------------|
| 1     | 17.01.2023      | 14.02.2023      | 8.169               | 500.3             | 22.24                                     |
| 2     | 17.01.2023      | 14.02.2023      | 8.184               | 484.9             | 21.55                                     |
| 3     | 17.01.2023      | 14.02.2023      | 8.154               | 496.2             | 22.05                                     |

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AG-01  
A.E.E

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*prk*  
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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 27.01.2023

## TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of the work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Sample ID** : Cement Concrete

**Size of cubes** : 150mmx150mmx150mm

**Cross Sectional Area** : 22500 mm<sup>2</sup>

**Technical Reference** : IS: 516-1959 (Reaffirmed 2008)

**Grade of Concrete** : M<sub>20</sub>

**Compressive Strength as on** : 7th day

| Sl.No. | Date of casting | Date of testing | Weight of cube (Kg) | Failure load (KN) | Compressive strength (N/mm <sup>2</sup> ) |
|--------|-----------------|-----------------|---------------------|-------------------|-------------------------------------------|
| 1      | 20.01.2023      | 27.01.2023      | 8.166               | 335.2             | 14.90                                     |
| 2      | 20.01.2023      | 27.01.2023      | 8.152               | 340.6             | 15.14                                     |
| 3      | 20.01.2023      | 27.01.2023      | 8.146               | 329.3             | 14.64                                     |

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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 17.02.2023

## TEST REPORT ON COMPRESSIVE STRENGTH OF CONCRETE CUBES

**Client** : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

**Agency** : Sri. Nandan Kumar M N, Contractor, Bangalore.

**Name of the work** : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

**Sample ID** : Cement Concrete

**Size of cubes** : 150mmx150mmx150mm

**Cross Sectional Area** : 22500 mm<sup>2</sup>

**Technical Reference** : IS: 516-1959 (Reaffirmed 2008)

**Grade of Concrete** : M<sub>20</sub>

**Compressive Strength as on** : 28th day

| Sl.No. | Date of casting | Date of testing | Weight of cube (Kg) | Failure load (KN) | Compressive strength (N/mm <sup>2</sup> ) |
|--------|-----------------|-----------------|---------------------|-------------------|-------------------------------------------|
| 1      | 20.01.2023      | 17.02.2023      | 8.189               | 501.2             | 22.28                                     |
| 2      | 20.01.2023      | 17.02.2023      | 8.156               | 478.5             | 21.27                                     |
| 3      | 20.01.2023      | 17.02.2023      | 8.134               | 489.3             | 21.75                                     |

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JobNo: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 14.02.2023

## TEST RESULTS OF AGGREGATE SHAPE TEST (Flakiness & Elongation)

Client : Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.

Agency : Sri. Nandan Kumar M N, Contractor, Bangalore.

Name of work : Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore.

BIS Code : IS 2386 Part (1):1963

Date of Test : 14.02.2023

Type of Mix : Dense Graded Bituminous Macadam

| SLNo. | Flakiness Index Value(%) | Elongation Index Value(%) | Total(Combined Flakiness and Elongation )(%) | Requirements                                                                                                                                   |
|-------|--------------------------|---------------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | 11.80                    | 13.20                     | 25.00                                        | Maximum allowable Combined Flakiness and Elongation Indices for Dense Graded Bituminous Macadam is 35% as per Table 500.8 MORTH Specification. |
| 2     | 12.10                    | 13.70                     | 25.80                                        |                                                                                                                                                |

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# CIVIL AIM CONSULTANTS & ENGINEERS

(Building Geo-Tech & Highway Materials Testing Laboratory)

An ISO 9001-2015 Certified Company

NABL Accredited As Per ISO/IEC 17025:2017 Laboratory



Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 17.02.2023

## Specific Gravity And Water Absorption Test

|                  |                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Client           | Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.                                                                       |
| Agency           | Sri. Nandan Kumar M N, Contractor, Bangalore.                                                                                                |
| Name of the Work | Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore. |
| BIS Code         | IS 2386(Part 3):1963                                                                                                                         |
| Type of Mix      | Bituminous Concrete                                                                                                                          |
| Date of Testing  | 15.02.2023 to 17.02.2023                                                                                                                     |

| Sl. No. | Details                                                | Notation                    | Test Number |        |        | Mean Value |
|---------|--------------------------------------------------------|-----------------------------|-------------|--------|--------|------------|
|         |                                                        |                             | Test 1      | Test 2 | Test 3 |            |
| 1       | Weight of aggregate suspended in water with the basket | $W_1 g$                     | 2021        | 2023   | 2025   |            |
| 2       | Weight of basket suspended in water                    | $W_2 g$                     | 755         | 755    | 755    |            |
| 3       | Weight of saturated aggregate in water                 | $(W_1 - W_2) = W_s g$       | 1266        | 1268   | 1270   |            |
| 4       | Weight of saturated surface dry aggregate in air       | $W_3 g$                     | 2017        | 2019   | 2021   |            |
| 5       | Weight of water equal to the volume of the aggregate   | $(W_3 - W_s) g$             | 751         | 751    | 751    |            |
| 6       | Weight of oven dried aggregate                         | $W_4 g$                     | 2010        | 2011   | 2012   |            |
| 7       | Specific Gravity                                       | $W_4 / (W_3 - W_s)$         | 2.676       | 2.678  | 2.679  | 2.678      |
| 8       | Apparent Specific gravity                              | $W_4 / (W_4 - W_s)$         | 2.702       | 2.707  | 2.712  | 2.707      |
| 9       | Water Absorption                                       | $((W_3 - W_4) * 100) / W_4$ | 0.35%       | 0.40%  | 0.45%  | 0.40%      |

### Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Concrete is 2.0% (MORTH table 500.16)

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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date: 22.02.2023

## TEST REPORT ON STABILITY OF MIX

|                    |   |                                                                                                                                              |
|--------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------|
| Client             | : | Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.                                                                       |
| Agency             | : | Sri. Nandan Kumar M N, Contractor, Bangalore.                                                                                                |
| Name of the Work   | : | Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore. |
| Source of location | : | Hot mix Plant, Bangalore                                                                                                                     |
| Type of Mix        | : | Bituminous Concrete                                                                                                                          |
| Date of Testing    | : | 22.02.2023                                                                                                                                   |

The results of the tests conducted on the Bituminous Concrete mix sample are as follows:

| Sl. No | Description                            | Test Result 1 | Test Result 2 | Requirement as per MORTH (Table 500-19) |
|--------|----------------------------------------|---------------|---------------|-----------------------------------------|
| 1      | Marshal Stability, Kn                  | 9.15          | 10.66         | 9 Kn (min)                              |
| 2      | Marshal flow, mm                       | 2.32          | 3.54          | 2 - 4                                   |
| 3      | Percent air voids in Mineral Aggregate | 13.66         | 14.18         | 13 - 15                                 |
| 4      | Voids in Compacted Mix                 | 3.45          | 4.21          | 3 - 6                                   |
| 5      | Percent Voids filled with Bitumen      | 70.63         | 71.85         | 65 - 75                                 |
| 6      | Density, g/cc                          | 2.25          | 2.26          | --                                      |

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Job No.: CACE/BBMP/NKMN/W.No.01/2022-23

Date : 22.02.2023

## BITUMEN CONTENT AND GRADATION DETERMINATION OF BITUMINOUS CONCRETE

AASHTO T 164 & AASHTO T 30

|                  |                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| CLIENT           | Assistant Executive Engineer, Yelahanka Sub Division, BBMP, Bangalore.                                                                       |
| AGENCY           | Sri. Nandan Kumar M N, Contractor, Bangalore.                                                                                                |
| NAME OF THE WORK | Improvements to roads and drains at Lakeview Layout and Jayamuni Layout in Kempegowda ward no-01 of Yelahanka Sub Division, BBMP, Bangalore. |
| SAMPLE ID        | Hot Mix Plant, Bangalore                                                                                                                     |
| DATE OF TESTING  | 22.02.2023                                                                                                                                   |

### BITUMEN CONTENT DETERMINATION

| Description                                          | Sample 1 | Sample 2 |
|------------------------------------------------------|----------|----------|
| 1. Weight of Mixture before Test, g                  | 500      | 500      |
| 2. Weight of Mixture after Test, g                   | 472      | 473      |
| 3. Weight of Asphalt and Mineral matter Extracted, g | 28       | 27       |
| 4. Weight of Mineral Matter, g.                      | -        | -        |
| 5. Weight of Ash, g                                  | -        | -        |
| 6. Weight of Bitumen Extracted, g. (corrected)       | 28       | 27       |
| 7. Bitumen content in %                              | 5.60     | 5.40     |
| 8. Average                                           | 5.50     |          |

### GRADATION AFTER EXTRACTION

| SIEVE SIZE | Test 1              |                             |                       |           | Requirement as per MORTH table 500.17 |
|------------|---------------------|-----------------------------|-----------------------|-----------|---------------------------------------|
|            | Weight Retained, gm | Cummulative Weight Retained | %Cummulative Retained | % Passing |                                       |
| mm         |                     |                             |                       |           |                                       |
| 19         | 0                   | 0                           | 0                     | 100       | 100                                   |
| 13.2       | 13.8                | 13.8                        | 2.9                   | 97.1      | 90 - 100                              |
| 9.5        | 65.9                | 79.7                        | 16.9                  | 83.1      | 70 - 88                               |
| 4.75       | 90.5                | 170.2                       | 36.1                  | 63.9      | 53 - 71                               |
| 2.36       | 46.3                | 216.5                       | 45.9                  | 54.1      | 42 - 58                               |
| 1.18       | 38.5                | 255                         | 54.0                  | 46.0      | 34 - 48                               |
| 0.600      | 50.3                | 305.3                       | 64.7                  | 35.3      | 26 - 38                               |
| 0.300      | 46.3                | 351.6                       | 74.5                  | 25.5      | 18 - 28                               |
| 0.150      | 38.5                | 390.1                       | 82.6                  | 17.4      | 12 - 20                               |
| 0.075      | 46.9                | 437                         | 92.6                  | 7.4       | 4 - 10                                |

| SIEVE SIZE | Test 2              |                             |                       |           | Requirement as per MORTH table 500.17 |
|------------|---------------------|-----------------------------|-----------------------|-----------|---------------------------------------|
|            | Weight Retained, gm | Cummulative Weight Retained | %Cummulative Retained | % Passing |                                       |
| mm         |                     |                             |                       |           |                                       |
| 19         | 0                   | 0                           | 0                     | 100       | 100                                   |
| 13.2       | 16.5                | 16.5                        | 3.5                   | 96.5      | 90 - 100                              |
| 9.5        | 66.8                | 83.3                        | 17.6                  | 82.4      | 70 - 88                               |
| 4.75       | 90.5                | 173.8                       | 36.7                  | 63.3      | 53 - 71                               |
| 2.36       | 46.2                | 220                         | 46.5                  | 53.5      | 42 - 58                               |
| 1.18       | 35.8                | 255.8                       | 54.1                  | 45.9      | 34 - 48                               |
| 0.600      | 55.6                | 311.4                       | 65.8                  | 34.2      | 26 - 38                               |
| 0.300      | 42.3                | 353.7                       | 74.8                  | 25.2      | 18 - 28                               |
| 0.150      | 38.9                | 392.6                       | 83.0                  | 17.0      | 12 - 20                               |
| 0.075      | 56.3                | 448.9                       | 94.9                  | 5.1       | 4 - 10                                |

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